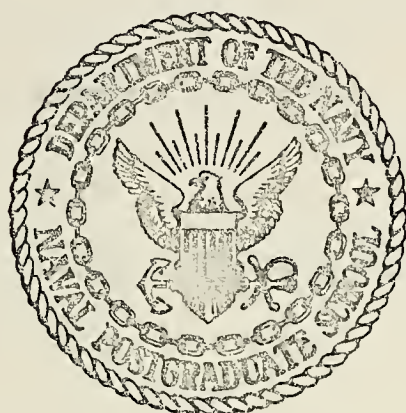

INDONESIAN NAVY
LOGISTIC SYSTEM

Koesnandar

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THESIS

Indonesian Navy
Logistic System

by

Koesnandar

June 1974

Thesis Advisor:

J. W. Creighton

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Item 20 (cont'd)

developing and implementing control devices which would assure Parliament that each echelon of management is effectively and efficiently managing all its resources.

Indonesian Navy

Logistic System

by

Koesnandar
Lieutenant Colonel, Indonesian Navy

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the
NAVAL POSTGRADUATE SCHOOL
June 1974

ABSTRACT

The Indonesian Navy logistic system as it exists today is a network of people, resources, organizations, and processes, regularly interacting to carry out the vital function of providing adequate logistic support of all kinds to the Naval Operating Forces so that they can accomplish their assigned missions.

Selective inventory management is currently being adopted to insure support of the Naval Forces at minimum total cost, and to maximize the cost-saving potential of the selective management policies.

The Navy is faced with the requirement of developing and implementing control devices which would assure Parliament that each echelon of management is effectively and efficiently managing all its resources.

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I. INTRODUCTION

This paper is intended to serve as a useful basis for discussion of logistics management problems among professionals in the Indonesian Department of Defense, and encourage thinking on how a Navy Logistic System may better satisfy the needs of the Defense mission. It is hoped that this paper will also serve as a guide to the changing logistics picture for use by all levels of management.

A sound knowledge of the organizational structure within which the naval logistician labors is helpful in understanding and in solving some of the problems. Chapter II describes briefly the basic naval logistics organization which exists in each of the three major components of the Naval Establishment, i.e., in the Headquarters, in the Shore Establishment, and in the Operating Forces.

Chapter III explores the functions and processes involved in meeting the needs of the Naval Operating Forces; the determination of requirements by the Naval Chief of Staff and the translation of those requirements into material by the Chief of Naval Material and his subordinates. This chapter also reviews the responsibilities of the Hardware System Commanders, and the main concept of Navy fleet logistics support, which is based upon three echelons of logistics: (1) the combat ships; (2) the mobile logistic support ships; and (3) the depot system.

Navy procurement which includes all functions that pertain to the obtaining of supplies and services, including statement of work, source

selection process, preparation and award of contract, and all stages of contract administration are discussed in Chapter IV as a part of the logistics process in the military.

Chapter V deals with physical distribution activity centers, and covers warehousing facilities, determination of transport requirements and capabilities, inventory control, unitization, and the most neglected activity, area distribution communication.

The objectives of warehousing facilities are: to provide better service to the Operating Forces, to reduce cost of transportation, and to maintain an investment in inventory sufficient to keep the right amount of stock on hand.

The essence of transportation is the movement of mass. It is produced by the operation of many kinds of vehicles in the dimensions of time, distance, and load. Transportation produces the elements of surprise, concentration, and artful deployment of military capability. Three factors are of primary importance in establishment of the transport capability: cost of service, speed of service, and consistency of service.

The Navy has adopted what is known as "selective management policies" in order to provide maximum use of every possible management improvement and modern inventory technique to insure support of the Naval Forces at minimum cost.

In the management of maintenance, the Navy applies the three levels of maintenance: first-line, second-line, and third-line. These are

distinguished by differences in capability of facilities concerned rather than by the type of maintenance performed, and are described in Chapter VI.

The Navy Planned Maintenance System is the primary system employed by the Navy in the management of its maintenance function. It is designated to: (1) simplify maintenance procedures, (2) define, schedule, and control scheduled and preventive maintenance, and (3) forecast and plan manpower and material requirements for maintenance.

Funding in logistic management is discussed in Chapter VII, where the maximum responsibility for management and control of the use of resources is placed as close to the point of consumption or use of those resources as possible.

The industrial fund as one of the revolving funds is controlled and administered through a tailor-made, double entry, accrual type accounting system.

Finally, the concluding remarks, as a brief summary, are presented in Chapter VIII.

II. BASIC NAVAL ORGANIZATION

There is one basic principle frequently stated but often lost sight of. This principle is that the Naval Headquarters and the Shore Establishment of the Indonesian Navy have only one reason for existence and one function to perform, that is: to provide adequate logistic support of all kinds to the Naval Operating Forces so that they can accomplish their assigned mission of fulfilling the Navy's role in support of fundamental National Policies.

A. THE NAVAL ESTABLISHMENT

The Naval Establishment prides itself on its flexibility and its ability not only to meet changes as they occur but to be ready for changes before they occur. So each day's Navy is just a little different from the Navy of the day before. Therefore, a detailed written description of the Naval Establishment is, in some manner, obsolete when the writing is finished.

The basic framework does change less rapidly, and the basic framework of the Naval Establishment consists of three major components:

- (1) Operating Forces
- (2) Naval Headquarters
- (3) Shore Establishment

1. The Operating Forces

The Operating Forces are the seagoing part of the Naval Establishment. The Operating Forces include: Naval Operating Forces

and Marine Operating Forces. The Operating Forces create the need for the Shore Establishment and the Naval Headquarters. In the successes of the Operating Forces, the Shore Establishment and the Naval Headquarters find their justification and satisfaction.

2. The Naval Headquarters

The Naval Headquarters is the executive part of the Naval Establishment, located in Jakarta. It comprises the Office of the Naval Chief of Staff, the Hardware System Command and the Headquarters of the Marine Corps.

Subject to the direction, authority, and control of the Naval Chief of Staff, the Naval Headquarters is the overall policy maker, command, administrative and logistics direction both of the Operating Forces and the Shore Establishment.

3. Shore Establishment

The Shore Establishment comprises all activities of the Naval Establishment not assigned to the Navy's Operating Forces and not part of the Naval Headquarters. These Shore Establishment activities are distributed throughout the Indonesian archipelago for the purposes of recruiting, training, equipping, maintaining, overhauling, repairing, supplying and rendering services in support of the Operating Forces. These activities are air stations, ordnance plants, recruit depots and training stations, shipyards, supply centers, and other activities of the Navy.

The Shore Establishment has three main types of activities; these are:

- (a) Naval Districts
- (b) Naval Air Stations
- (c) Marine Corps Supporting Establishments

The primary mission of most of the activities of the Naval Districts and of the Marine Corps Supporting Establishments is of a logistical nature.

B. NAVAL LOGISTIC ORGANIZATION

The task of the naval logistics organization is to communicate by designated channels to the national government the requirements of the naval combat forces and to procure through designated channels the weapons, supplies and services necessary to equip, maintain and support the naval combat forces. The more comprehensive task of national logistics is to carry out those administrative and technical processes by which this naval support may be rendered.

The Naval Logistic Organization exists in each of the three major components of the Naval Establishment, i.e., in the Headquarters, in the Shore Establishment and in the Operating Forces. At the Naval Headquarters level, the primary mission of the Hardware System Command is logistical. At the Shore Establishment level, the major units, the Naval Districts and the Naval Bases have as their primary mission the support, service and maintenance of the seagoing Operating Forces. In the Operating Forces, major type commands and major air and submarine bases ashore have a similar primary mission, the support, service and maintenance of the Operating Forces. The basic structure of the naval organization is depicted in Figure 1.

III. THE NAVY LOGISTICS NETWORK

The Navy Logistics System, a system which has evolved through the years, adapting itself to the changing requirements demanded both by application of technological advances and the acquisition of new responsibilities, is an intricate complex of many functions, processes, and organizations, both administrative and physical, which themselves carry responsibilities of varied kinds bearing on logistics.

Logistics support, which is an element of that broad activity called logistics is concerned with the maintenance and movement of forces. More specifically, it is an element of Naval material logistic support, which, briefly, consists of determination of requirement, procurement, distribution, and maintenance of material to equip and support Naval Forces.

Thus, the Navy Logistic System as it exists, in practice is the network of people, resources, material, processes and organizations, regularly interacting to accomplish the vital function of keeping the Navy supplied.

A. REQUIREMENTS DETERMINATION

The Naval Chief of Staff is responsible to plan for and determine the material support needs of the Naval Operating Forces, including equipment, weapons or weapons systems, materials, supplies, facilities, maintenance, and supporting services. This responsibility includes the

determination of the military performance requirements of and priorities for things to be developed or procured; and the determination of the order in which ships, aircraft, surface craft, weapons, and facilities are to be acquired, constructed, maintained, altered, repaired, and overhauled.

The Assistant Naval Chief of Staff (ANCS) (Intelligence); ANCS (Fleet Operations and readiness); ANCS (Personnel); ANCS (Logistics); ANCS (Plans and Development) and ANCS (Communications) together with the ANCS (Air) are the primary offices in the Office of the Naval Chief of Staff for the formulation and review of Navy requirements.

Requirements determination decisions stated by the Naval Chief of Staff are classified as qualitative or quantitative. The ANCS for Fleet Operations and Readiness and Air make quantitative requirements determinations for ships and aircraft which may be expressed in finite terms: number of ships, aircraft, or major equipments to be procured or supported; or in general terms, unit allowance lists, individual aircraft ordnance loads, consumption rates, sortie rates, or number of aircraft missions to be supported.

The ANCS (Logistics) is the principal advisor to the Naval Chief of Staff on the conduct of logistical affairs and is responsible to plan and provide logistic support needs of the Operating Forces of the Navy. Logistic support for the operating forces is coordinated by the Fleet Commander. The ANCS (Logistics) has primary responsibility for stating the requirements for ships and facilities support equipment and material. He also gives these determinations in broad terms, such as the number of days endurance and the required degree of supply effectiveness (filling of demands on board)

to be built into allowance lists, policy with respect to insurance items to be carried aboard ships, policy with respect to range and depth of stocks to be carried by ships of the Mobile Logistics Support Forces and other logistics guidance.

B. MANAGING THE NAVY'S INVENTORY

The Chief of Naval Material (CNM) under the Naval Chief of Staff, commands all activities of the Hardware System Commands. He is responsible to the Naval Chief of Staff for providing the material support of the Navy's Operating Forces. Obtaining the required material within the budget is a function of the Hardware System Commanders. It should be noted, however, that while these Hardware System Commanders are responsible for having material available to the Navy's Operating Forces, the centralized procurement and management of certain categories of supplies, i.e., food, medical and dental supplies, fuel, oil and lubricants, general industrial supplies, housekeeping supplies, clothing, and common mechanical and electronic repair parts are the responsibility of the Defense Supply Agency.

The Navy is responsible for centralized procurement and inventory control (computation of item requirements, determination of item procurement and repairs, and the necessary distribution of items) of aeronautical equipment and repair parts; ship equipment; ship equipment-related components and repair parts; expendable ordnance; non-expendable ordnance equipment and related components and repair parts; automotive, construction, and Navy training devices.

The basic task of the Hardware System Commanders is to have the right amount of stock on hand when needed, neither too much stock nor too little. This calls for maintenance of stock levels at each support level, ships, Mobile Logistic Support Forces, and distribution centers so that items are available when and where they are needed and inventories are kept to a minimum, consistent with the need.

The Navy has attacked this problem by developing policies of selective inventory management. These policies recognize that it is impossible to manage every item of supply in the same way and still meet the criteria above. For some items, supply performance is primary; the item must be ready for issue upon demand wherever it is needed and whatever the cost. Efforts are made, however, to keep this group to a minimum. For other items, keeping inventories at the lowest practical level is the important factor because of high turnover and heavy investment in such items. For yet another group of items, those which are low in dollar value and turnover, the workload and cost of maintaining such items is the controlling element. Therefore, selective inventory management concentrate time and attention on those Navy items justified by military essentiality or by dollar turnover. It weighs the cost of inventory against the cost of personnel and reporting system to arrive at the most economic overall method of inventory management.

C. RESPONSIBILITIES OF HARDWARE SYSTEM COMMANDERS

Items are assigned to the Hardware System Commanders by the Chief of Naval Material based on the principle that only one Hardware

System Commander will manage each supply item. The objective of all the Hardware System Commanders is to assure a proper balance between supply and demand, keeping within the budget to provide responsive and efficient support to the Navy's Operating Forces. The Navy Hardware System Commanders are responsible for all the items assigned to their control.

1. Naval Ship System Command

This command is responsible for whole ships and craft and for most nonordnance shipboard components, such as propulsion, power generating, sonar, and auxiliary equipment; coordination of all shipboard subsystems; technical guidance, and supervision of operations related to salvage of stranded and sunken ships and craft. This command is the central technical authority for ships.

2. Naval Ordnance System Command

This command is responsible for shipboard weapon systems and expendable ordnance, mines, and torpedos. This command is the central technical authority on explosives, propellants and explosives ordnance disposal.

3. Naval Electronic System Command

This command is responsible for shore-based electronic systems and certain common-use shipboard electronic equipment, such as navigation, communications, electronic countermeasures, and general test equipment. This command is the central technical authority on electronic standards, and compatibility.

4. Naval Public Works Command

This command is responsible for the administration of the Navy military construction program, facilities planning, facilities maintenance and utility operations, and real property inventory management. It performs material support functions related to public works, floating cranes, pontoons and moorings, construction, and weight-handling equipment. It also provides engineering and technical services.

5. Naval Air System Command

This command is responsible for aircraft and other aviation-related equipment, and the system integration of aircraft weapon systems. This command is the central technical authority for aircraft and related support equipment.

6. Naval Supply System Command

This command is responsible for supply management policies and methods; administration of the Navy Supply System, publication and printing, the field purchasing service, and transportation of Navy property; and material functions related to materials handling equipment, food service, and special clothing.

The NAVSUP has cognizance of the procurement of materials and services throughout the Navy. The NAVSUP is also responsible for conducting the formalities of procurement by negotiation or formal advertising for other Navy procuring activities to the extent provided in applicable regulations.

It is basic Navy policy that the inventory management of Navy material will be assigned to the Inventory Control Point under the NAVSUP. The guidelines that specifically apply in implementation of this policy are:

a. The NAVSUP will manage items procured for other than immediate use. These items consist of equipment, component repair parts, consumables, installation material, and items required for test and repair purposes. This includes not only items required in support of equipment and systems installed and in use, but repairables which are returned for overhaul, repair, or modification and return to storage for further distribution.

b. The Navy logistic system functions on the basis of centralized control assets. The nerve center of the Navy logistic system is the Inventory Control Point. In effect, the ICP performs functions of the NAVSUP and the other technical and hardware systems which have been decentralized to the field.

D. THE FLEET LOGISTICS SUPPORT

The main characteristic of the operating forces, their readiness, mobility, and endurance prescribes the form of support which the Navy logistic system renders. The fleet is virtually always mobilized, only the tempo varies. Conceptually, Navy fleet logistic support is based upon three echelons of logistics: (1) the combat ships; (2) the mobile logistic support ships; and (3) the depot system.

The first of these echelons provides the material specified in the Shipboard Allowance List, which is carried on board the ship itself. The allowance list is tailored to the individual ship based on the ship's equipment, military essentiality of the ship's systems, and composition and size of the crew. The range and quantity of material on the ship's allowance list usually is computed to provide balance for a period of three months. This objective must be modified in the case of large bulky consumable items such as food, fuel, and ammunition, when space constraints do not always allow a full three months supply to be carried. The allowance list also provides for "insurance" items. These are spares and repair parts not having a predicted usage of at least one in three months, but which are vital to support the primary mission of the ship or vital to the crew's safety or welfare. The objective of the allowance list is to maximize endurance and provide balanced support for a specified period.

The second echelon of combat logistic support consists of the ships of the Mobile Logistic Support Forces which include tenders, oilers, repair ships, and fleet issue ships. The second echelon of fleet support backs up the first echelon of allowance list material carried in the combatant ships. Fleet issue ships play a special role. These ships, carrying cargoes of consumable items tailored to the combat forces they support, can rendezvous with a task force in the forward area and, by ship-to-ship transfer, keep the fleet at sea and on station for extended periods of time.

The material carried in the mobile logistic support ships is prescribed in accordance with load lists which reflect support mission and type of ships supported. The load lists, like the ship's allowance lists, prescribe both the range and quantity of material to be carried aboard the individual mobile support ships. They do not duplicate those insurance items included in the combatant ship's allowance list. Instead, they increase the combatant ship's endurance by providing a source of fuel, ammunition, repair parts, and general consumable items. The combination of the first and second echelons of combat logistic support satisfies the Naval Chief of Staff that the deployed fleet will be self-sufficient to permit operations in combat for from three to six months without the necessity of resupply from the distribution centers.

The third echelon of logistics provides the material located predominantly at the supply centers. These logistics activities serve as the material reservoir and act as pipelines between industry and other logistic systems and the fleet.

In addition to fleet support, the centers provide support to the activities of Shore Establishments: The Naval Air Stations, ordnance stations, shipyards, training stations, and smaller shore activities.

The basic responsibility for providing this logistics support to meet the total user needs for most of the Navy supply items rests with the inventory control point.

The Inventory Control Point determines the quantity and range of items to be carried at specific locations and positions these inventories at the supply centers. In addition to the supply centers subject to NAVSUP

control, the supply departments of the air stations, shipyards, and ammunition depots are significant elements of the Navy Logistic System for receipt, storage, and issue of material on a Navy-wide basis.

Figure 2 depicts conceptually the Navy fleet logistic support.

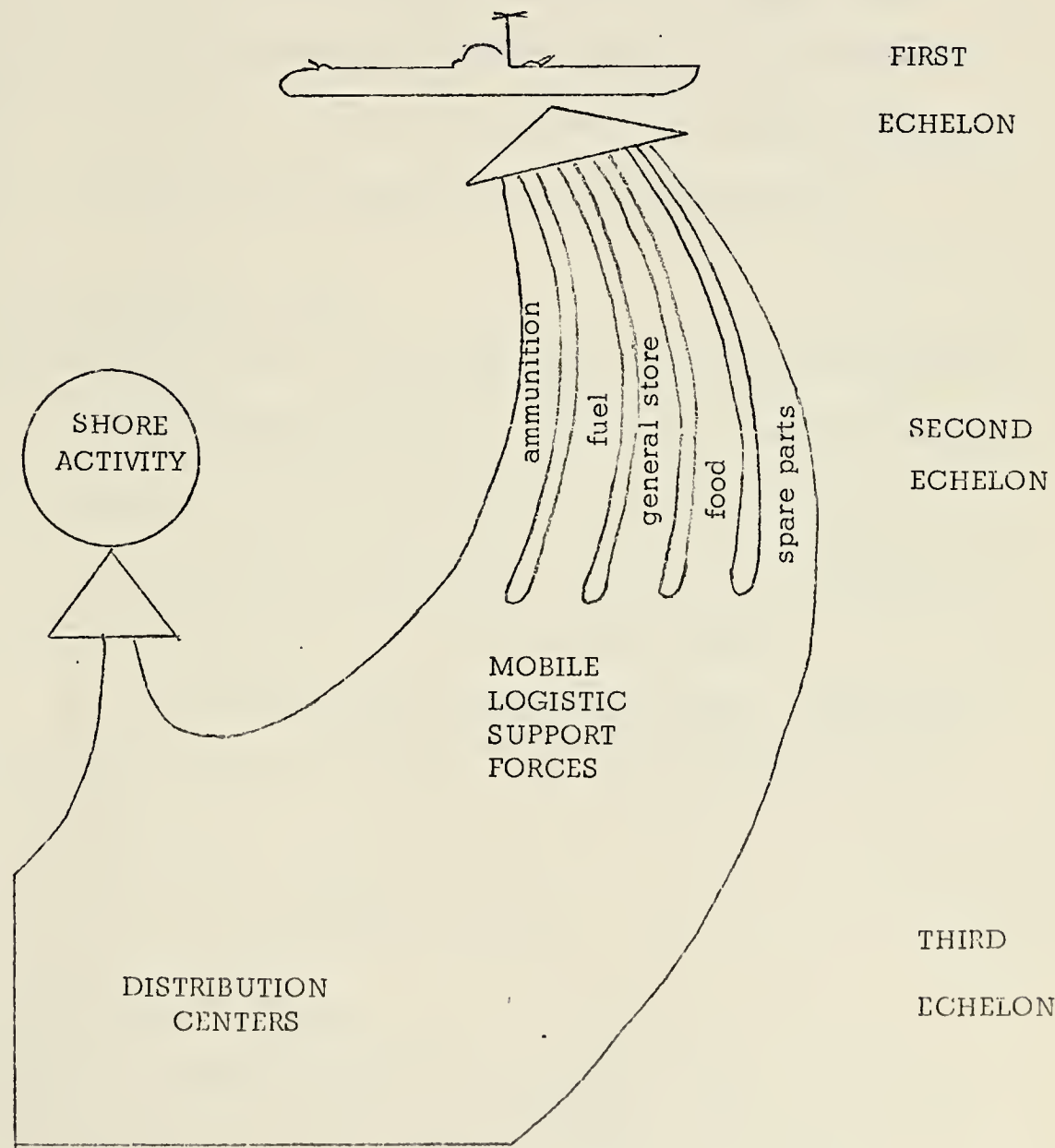


Figure 2

IV. PROCUREMENT AND LOGISTICS MANAGEMENT

A. DEFINITION

Procurement is a part of the logistics process in the military. Procurement includes purchasing, renting, leasing, or otherwise obtaining supplies or services. It also includes all functions that pertain to the obtaining of supplies and services, including description but not determination of requirements, selection and solicitation of sources, preparation and award of contracts, and all phases of contract administration.

B. THE PROCUREMENT CYCLE

The procurement cycle may be broken down into three distinct phases:

- (1) Presolicitation phase. Begins with procurement planning and culminates in the preparation of the solicitation package.
- (2) Solicitation-award phase. Begins with the distribution of the solicitation package and culminates in contract award.
- (3) Post award-contract administration phase. Encompasses entire period of the contractual obligation, from award to final retirement of the contract file.

These phases are as depicted in Figure 3.

C. PRESOLICITATION PHASE

Advance Procurement Planning is the means by which the efforts of all personnel responsible for the procurement of the Navy material by contract are coordinated as early as practicable in order to obtain required

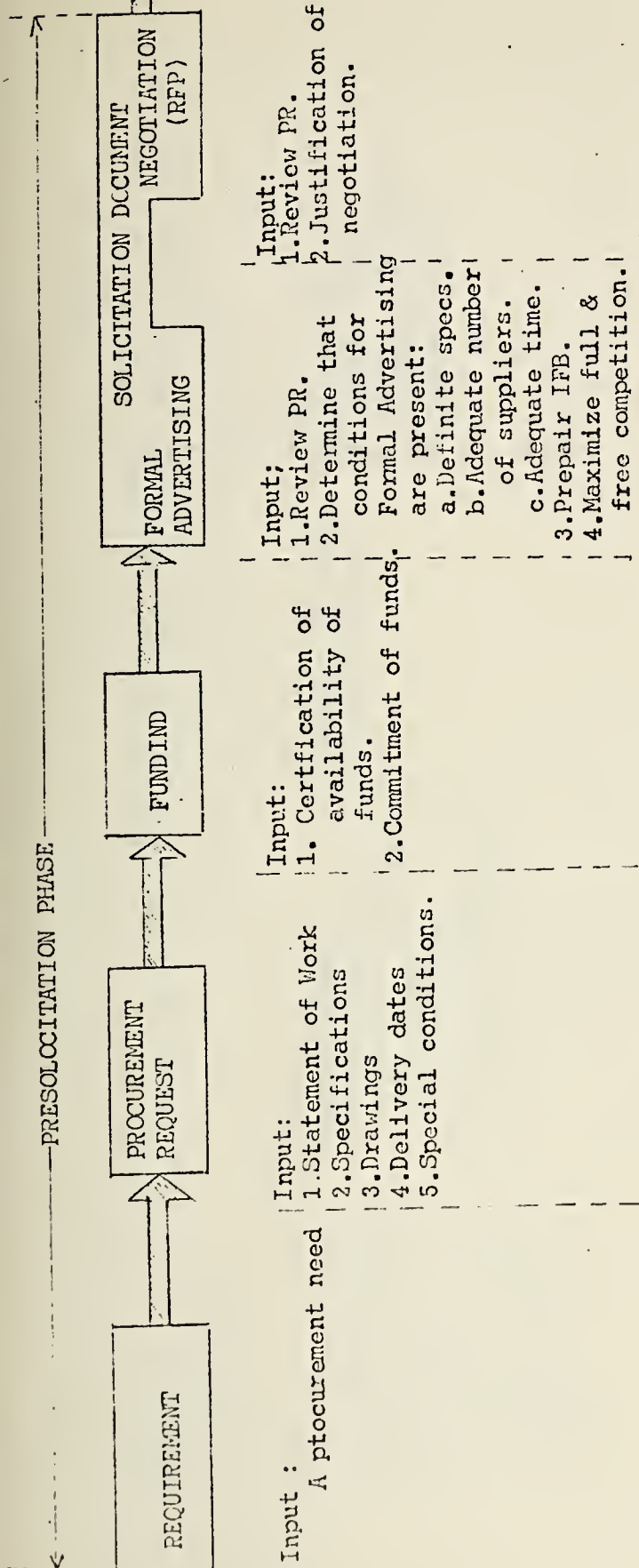


Figure 3

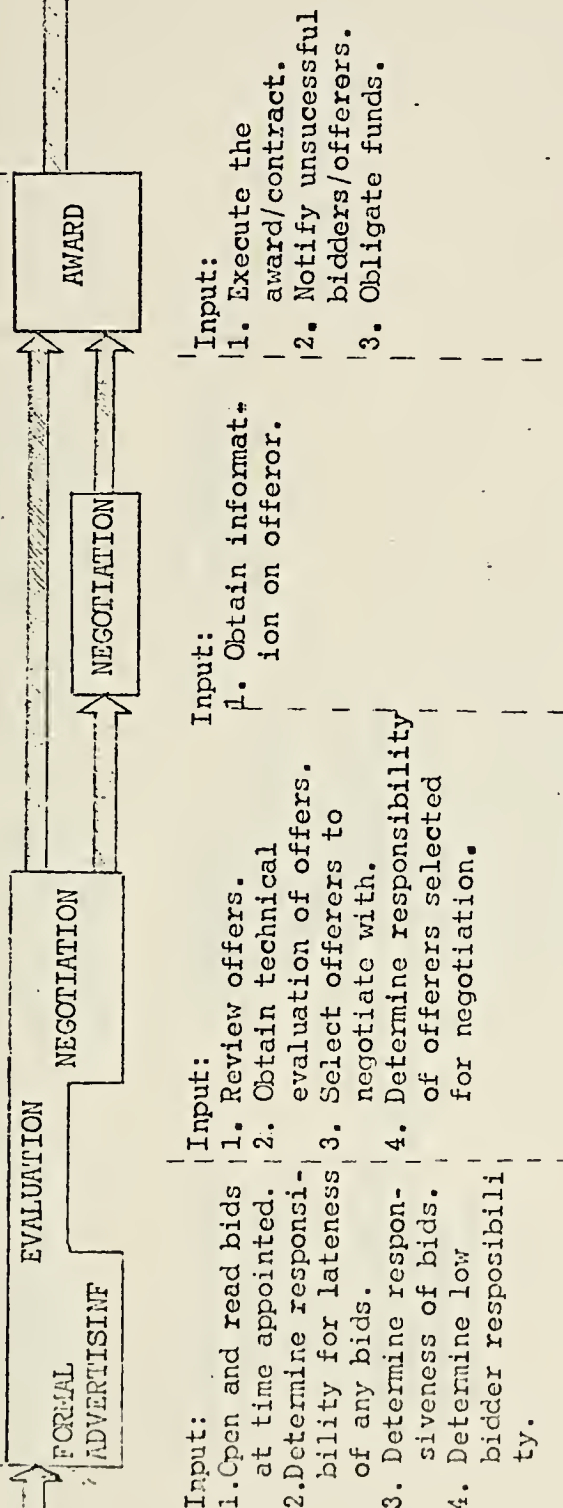


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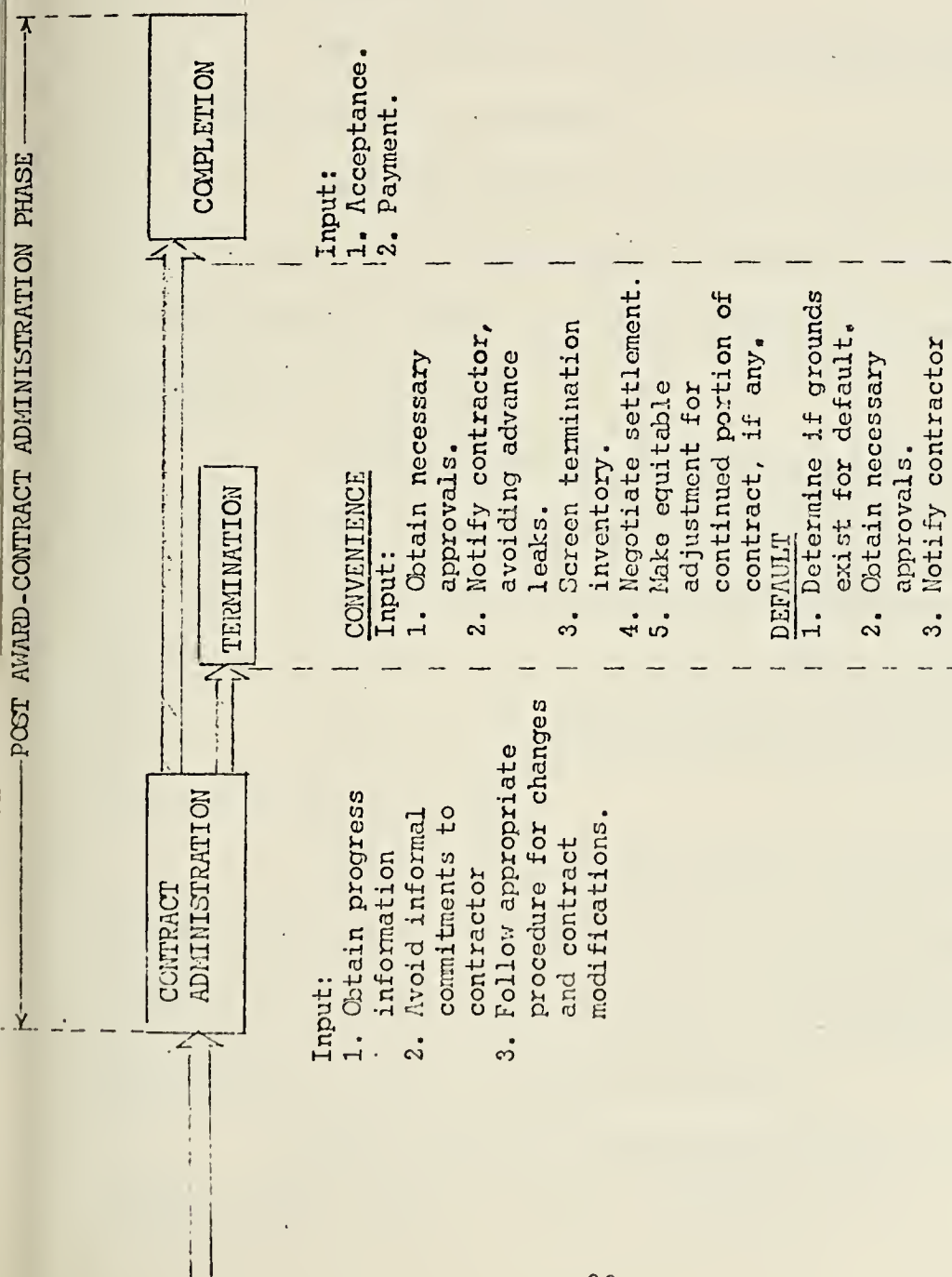


Figure 3 (continued)

items of the requisite quality, on time, and at a fair and reasonable price. Advance Procurement Plans, integrate technical, business, policy, and procurement factors, considering performance goals, timing, and potential costs. While Advance Procurement Planning applies to the more complex procurement programs, its principles may also be utilized in all procurements.

1. Method of Procurement

The two principal methods of government procurement are formal advertising and negotiation.

Formal advertising is the means of contracting through the use of a competitive procedure which includes solicitation of bids and the awarding of a contract to the lowest responsible bidder, whose bid conforms to the invitation.

The purpose served by formal advertising has been and is, the maximization of benefits to be secured by the utilization of competition in the market places of the country. Under ordinary circumstances, competition for government business results in lower prices and higher quality; while at the same time, it encourages adequate sources of supply through the elimination of favoritism.

It has been the government policy that all procurement must be formal advertising whenever possible, although the Department of Defense has special authority to negotiate under specified conditions. Negotiation is always the exception, however.

Formal advertising begins when a military activity, which needs a certain product or service, describes the items in a purchase

request. This is submitted to the purchasing activity which does its buying. The requiring activity is held responsible for referring to all applicable specifications, plans, or drawings, or, if nothing better is available, for providing a purchase description which adequately specifies all the essential features of the item needed. Once the contracting officer has determined that the procurement is susceptible to formal advertising, the next step is to transfer the information contained in the requisition to the schedule of an invitation for bids that will be issued, in such terms that the requirements of the government are completely defined. It is the individual contracting officer's responsibility to determine that the terms and conditions included in the schedule of the invitation for bids fully and completely describe the needs of the government.

D. SOLICITATION-AWARD PHASE

Complete invitations are circulated as widely as possible, in order to obtain maximum competition. There are various ways of soliciting bids, the principal method being the mailing or delivering of invitations to the prospective bidders. Mailing lists of bidders are kept at purchasing activities to provide ready information on current sources of supply. All suppliers who appear to be qualified and eligible to fill the requirements of a particular procurement are carried on the appropriate mailing list. Additional methods of soliciting bids include the displaying of copies of the invitation at the purchasing office and at other appropriate public places; publishing brief announcements of proposed purchases in trade

journals; and, in some instances, by publishing the essential details of a proposed purchase in newspapers.

One of the essential characteristics of formal advertising is that all bidders are afforded equal opportunities to bid. For this reason, necessary technical or other information to or from bidders during this period must be transmitted through the contracting officer. No disclosures or commitments can be made to any bidder which may give him an advantage over other bidders. The contracting officer frequently discovers through correspondence from a prospective bidder or by discussion with him that ambiguities or inconsistencies exist in the invitation which, if not corrected, may result in the receipt of non-responsive bids. In such cases, a timely amendment can be issued to the invitation for bids, or the invitation may be cancelled, if deemed necessary.

To insure that all suppliers are equitably treated, no information concerning a pending or prospective purchase can be divulged to persons other than those directly concerned with the purchase and who are required to have the information in the performance of their duties. Any discussions or correspondence are handled through the contracting officer or his delegated personnel.

Each invitation for bid sets forth a specific place, date, and time for the opening of bids. The invitations should be circulated a sufficient time in advance of the opening date so that all those who care to bid are afforded an adequate opportunity to prepare and submit their bids. It is the responsibility of each bidder to ensure that his bid is submitted in time to be received for the bid opening.

1. Receipt and Opening of Bids

Once the bids submitted in response to an invitation for bids are received, they are opened at the specified time and publicly read aloud. In addition, all bids received are recorded on a form called an abstract of bids. The abstract is completed as soon as possible after the opening of the bids and is certified by the bid opening officer.

2. Modification or Withdrawal of Bids

Bids may be modified or withdrawn, at any time prior to the time fixed for opening, by written or telegraphic notice received prior to the time fixed for opening. A modification or withdrawal of a bid, if sent before the time set for opening, even though not received until afterwards, may generally be given effect if (1) the bidder is not responsible for the delay in transmission, and (2) it is clearly shown that the modification or withdrawal was not submitted with knowledge of the terms of other bids. A bid may, however, still be modified after the opening of the bids when the modification is in the interest of the government and is not prejudicial to the other bidders. Therefore, for example, where the low bidder offers to reduce his price, the modification may be accepted. Since the low bidder was already entitled to the award, obviously no valid complaint could be made by other bidders.

3. Bid Evaluation

The contracting officer next faces the considerable and often extremely difficult job of evaluating the bids received. This is the process of determining whether each bidder's offer meets the requirements of the invitation, both as to what is offered and as to the contractual terms as

well. During evaluation, the contracting officer may be faced with the necessity of eliminating some bids from consideration, or even in some circumstances, of rejecting all bids and readvertising the procurement. Ordinarily, any bid which does not conform in every respect to the essential requirements of the invitation for bids must be rejected. The basic standard applied is whether any deviation in what is offered by the bidder affects the price, quantity, or quality of the item or the contract terms specified by the government. If the deviation does affect terms or specifications, the contracting officer must reject the bid. The bidder cannot be permitted to alter the evaluation by curing the defect after the bids have been opened.

4. Responsiveness of Bids

A bid submitted in accordance with the invitation must comply in all material respects with the invitation both as to method and timeliness of submission and as to the substance of any resulting contract. A bid which is not submitted in accordance with the invitation or which contains qualifying terms or language of a substantial nature is considered to be nonresponsive. Such a bid must be rejected.

An unsigned bid may not be considered. A bid which contains the corporate name of the bidder and the typed name of the vice president in the space provided for signer's name and title, but no signature in the box headed "signature of person authorized to sign bid" or anywhere else on the bid must be rejected. This defect, being substantive, cannot be waived. When the bids lack proper signature, with no other indication in the bid submission that the purported bidder intended to submit the bid, a contracting officer cannot be sure that the bid was submitted by someone

in authority. Acceptance of a bid may not automatically obligate the named bidder.

A bid which fails to state opposite each part number that the article complies with specifications, if required by invitation for bid, must be rejected as nonresponsive. Since bid information is material and a failure to indicate complete compliance of parts with specifications, after specified admonition in the invitation, is a deficiency fatal to the bid. The deficiency may not be waived since the only errors which may be corrected after opening are those which do not affect responsiveness of the bid.

The primary and underlying purpose behind the insistence on responsive bids is that all bidders must stand on an equal footing so that the integrity of the formal advertising system may be maintained.

When it is in the interest of the government, contracting officers may waive minor deviations in bids which (1) do not affect the price, quality, etc., of the articles to be furnished, and (2) do not prejudice the rights of other bidders. In such cases, however, the preferred procedure, time permitting, is to allow the bidder the right to correct the informality of irregularity prior to the award of the contract.

5. Responsible Bidder

The distinction between a responsive bid and a responsible bidder is that the latter concerns the ability to perform the contract and involves the bidder's capacity, while the former concerns only the bidder's willingness to perform on the government's terms.

The phrase responsible bidder refers to something more than just pecuniary capacity of the bidder. Such factors as judgment, skill and integrity play important parts in the overall determination. This means that the contracting officer must establish that the prospective bidder meets all of the following requirements:

(1) is a manufacturer, construction contractor, or regular dealer, if the contract or order calls for supplies;

(2) has adequate financial resources, or the ability to secure such resources;

(3) has the necessary experience, organization, and technical qualifications, and has or can acquire, the necessary facilities to perform the proposed contract;

(4) is able to comply with the required delivery schedule, or performance schedule;

(5) has a satisfactory record of performance, integrity, judgment and skills; and

(6) is otherwise qualified and eligible to receive an award under the applicable laws and regulations.

In practice, there are four principal criteria used to determine whether or not a bidder is responsible. The four criteria are (1) status as a manufacturer, construction contractor, or regular dealer, (2) financial position, (3) skill and experience, and (4) prior conduct and performance of government contracts. In addition, integrity, or lack of it, is a major consideration in the determination of responsibility.

The determination of financial responsibility includes not only the bidder's current financial position and an evaluation of it, but also future plans and estimated financial position and an evaluation of it. A bidder who is in receivership is not a responsible bidder.

The skill of the bidder, of course, bears directly on his offer. Skill and experience are difficult, in many cases, to evaluate. Furthermore, the degree of skill or experience required varies with the complexity of the undertaking the bidder assumes under the proposed contract. Standards to measure skill and experience are more or less subjective.

Probably the best measurement of skill and experience, and the probability that the bidder will satisfactorily complete the performance asked of him, is prior conduct and performance record. The past is ordinarily an ample test of the future but isolated events or happenings can only be weighed into the entire past fabric in order to determine with any degree of accuracy what future performance is likely to be. A single default on a prior government contract, standing alone, does not warrant a determination that the bidder is not presently responsible. On the other hand, prior conduct or performance or classification can indicate the likelihood of current irresponsibility. Debarment or prior criminal convictions are very serious matters and weigh extremely heavy in the overall determination of current responsibility.

Where a bid is rejected because of the prospective contractor being found to be irresponsible, the contracting officer must make and file a report of nonresponsibility. Supporting documents including any surveys made are attached to the filed report on nonresponsibility.

6. Relief Before Award

Two types of relief are available if, before award, it can be shown that a mistake was made in the bid.

The bid can be completely withdrawn if it is reasonably established that it involves an honest mistake. The contracting officer cannot accept a bid in good faith if he knows or reasonably should have known that a mistake was made.

In certain cases a bidder may be permitted to correct the mistake in the bid. This is an exceptional remedy allowed in only a small percentage of cases. If bidders were permitted to change after learning competitor prices quoted, the competitive bidding system would break down.

In general, a higher degree of proof is required for correction than withdrawal. To establish a basis for correction, the bidder must conclusively prove: (1) that a mistake was made, (2) the nature of the mistake, (3) the term actually intended. The correction will not be allowed if it will raise the bidder's price above that of the next lowest bidder.

In cases where both the error and the intended term can be determined from the bid documents, the bidder may be allowed to correct a high bid price downward so as to make him the lower bidder. Acceptance of a bid which on its face is the lowest bid is not prejudicial to the other bidders.

Finally, the contracting officer must determine which bid actually offers the government the lowest price. To do this, he must take into account the actual price bid and additional factors such as offered

discounts, price escalation provisions, transportation costs, and the like. Award of a contract will finally be made to the lowest responsible bidder who survives all of the above evaluation, whose bid conforms to the essential provisions of the invitation for bids, and whose price is found to be fair and reasonable.

Formal advertising is the most effective procedure where:

- (1) An adequate number of qualified suppliers compete for the work;
- (2) Definitive specifications are available to describe the items required;
- (3) Suppliers are willing to bid competitively;
- (4) Time is adequate to permit the formalities of advertising.

If any of these is lacking in a particular case, negotiation is best, provided the situation meets one of the exceptions permitting negotiation.

7. Procurement by Negotiation

Negotiation is the process of conferring, bargaining, or discussing with a view to reaching agreement. In terms of procurement, negotiation is any method of procurement made without formal advertising. In terms of contract pricing, negotiation is the process of bargaining between buyer and seller with the objective of reaching an agreement on the price, terms and conditions of the transaction.

In general terms, negotiation is used when: (1) there is no evidence, or insufficient evidence, of a competitive price situation;

(2) urgent requirements override the delays normally incident to formal advertising; (3) public policy considerations supersede the benefits to be gained from formal advertising.

The authority to negotiate permits the contracting officer the necessary flexibility to deal with a variety of circumstances. This element of flexibility, possibly more than any other consideration, is the reason for the exception of certain procurements from formal advertising procedures.

Negotiation requires the highest degree of skill, because the contracting officer must determine whether the proposed price is a fair and reasonable one. This requires knowledge of industrial processes, considerable experience in negotiation techniques, sound business sense, and a high degree of intelligence and diplomacy.

Most people commonly think in terms of negotiating for the lowest price. However, in many instances, contract terms can be even more important than a given amount or price change. Therefore, the contracting officer must know the importance of many related factors, such as urgency of need for early delivery, performance, quality of product or services to be procured, patent protection and the like.

8. Types of Contracts

A contract is a promise or a set of promises for the breach of which the law gives the remedy, or the performance of which the law in some way recognizes a duty. A contract may consist of a single promise by one person to another or there may be indeed any number of persons or any number of promises. Technically, there is a difference between contract and agreement. Agreement is a broader term since it encompasses

promises which the law will enforce as well as those which the law will not enforce.

Because the type of contract affects the resulting price to the government, use of an appropriate type is of primary importance in obtaining a fair and reasonable price. If it were always possible to deal on a fixed-price basis, selection of contract type would be no problem. In a rapidly changing technological world, however, buying many items on a fixed-price basis would be costly and wasteful. Therefore, government uses two basic types of contracts: fixed-price contract and cost-type contract.

The Firm Fixed-Price contract is the most preferred type for harnessing the profit motive because the contractor accepts full cost responsibility, and the relationship between cost control and profit dollars is established at the outset of the contract. Accordingly, whenever a reasonable basis for firm pricing exists, the firm fixed-price contract shall be used, because its use under these circumstances will provide the contractor with a maximum profit incentive to control the costs of performance. However, the contracting officer must be alert to the fact in certain situations the use of special contract incentive provisions may be more appropriate. While maximum incentive to a contractor exists in a firm fixed-price contract, the basis for the application of firm fixed-price is the knowledge that the price has been arrived at either through competition or through sound pricing techniques which keep pricing uncertainties to a minimum. In those situations in which price competition is not present, and (1) where the cost of pricing data available do not permit sufficiently

realistic estimates of the probable cost of performance, or (2) where uncertainties surrounding the contract performance cannot be sufficiently identified to evaluate their impact or price, the use of a type of contract other than firm fixed-price should be considered.

Fixed-Price with Escalation is normally used for contracts involving a large amount of money and a long period of accomplishment; contractors usually prefer not to quote a firm fixed-price because of inflationary possibilities. If forced to make such a quotation, contractors will include in their price, in a period of inflation, contingencies for increases in the cost of labor and materials. To avoid inclusion of such contingency costs, which work to the disadvantage of the government (it has everything to lose and nothing to gain), the government should use an escalator clause. Escalation provides for either an upward or downward change in price as a result of changes in either material prices or labor rates. Published labor and commodity indices are generally the basis on which changes are agreed to by the government and the contractor. However, reaching agreement on the most appropriate indices to be used can in some situations be difficult.

Fixed-Price with Redetermination is different in concept from fixed-price with escalation. In contrast with escalation, the amount of labor and material required to fulfill the contract are known; it is the "wages" of labor and the "prices" of material that are unknown. In cases involving redetermination, the amount of labor and materials (and in some cases their prices also) are unknown.

Because of these unknowns, a firm fixed-price contract would be impractical, however, a temporary estimated fixed-price is agreed to. The government generally believes the agreed upon price is too high, and expects it ultimately to be lowered when it is reviewed later. In the meantime, it is protected from unknown raises. This is why the contract is classified as a fixed-price type; the price cannot go higher than the temporary price.

Fixed-Price Incentive is a variation of the redetermination type of pricing. It is complicated in that it provides a base for a target price, a ceiling price, and a variable profit formula, depending on the type of contract for which it is used. This contract is generally used when a reasonable target price can be established but exact pricing is impossible.

Cost-type contracts are used only when it is impossible to contract on a fixed-price basis. The distinctive difference between a fixed-price and a cost-type contract is that under cost pricing, the government assumes almost all the financial risk. Another disadvantage is that cost-type contracts are very expensive to administer, as allowable costs must be agreed upon in advance and must subsequently be audited.

Cost-Plus Fixed Fee contracts provide that the contractor shall be paid for all his allowable costs plus a fixed fee. The fixed fee is usually a percentage of the estimated cost.

Cost-Plus Incentive Fee is a variation of the fixed-price incentive contract. The government and the contractor agree beforehand on a tentative fee based on the estimated costs, and they establish a target

price. If the contractor can reduce his costs, both the government and the contractor share in the reduction, as long as the costs drop below the target. Under this type of contract, a contractor can lose all or part of his fee, but all his costs must be paid by the government.

E. POST AWARD CONTRACT ADMINISTRATION PHASE

1. Contract Administration

The contract administration team, located at the contract administration office, consists of an Administrative Contracting Officer (ACO) who is supported by specialists in price analysis, quality control, production, labor relations, accounting and finance, engineering, law, and transportation.

The Contract Administration Office is responsible for:

- a. Assuring compliance with the terms of the contract.
- b. Serving as a focal point for all inquiries regarding status of deliveries and production, quality of material, and other contract administration matters.
- c. Keeping the purchasing office and other interested activities advised of all pertinent matters related to the administration of the contract.
- d. Assigning supporting contract administration when required.

In addition, the Contract Administration Office has the primary responsibility of providing pre-award surveys, checks contractor progress, provides for the use of government-owned facilities and provides support package facilities.

2. Termination for Convenience

The right to terminate the contract for the convenience of the government is, simply stated, the right of the government to refuse to continue with contract performance, to stop the work and settle with the contractor at the point of termination, as set forth in the contract.

In order to protect itself against having to accept outmoded equipment, materials, or supplies that have revealed deficiencies, or where goods at the time they were ordered may become excess prior to contract completion, the government has the right of termination of contract for convenience. Such a termination occurs when the contracting officer determines that, for reasons other than the default of the contractor, it is in the best interest of the government to discontinue all, or some part, of the work remaining under an uncompleted government contract, at any time during contract performance.

The right to terminate for convenience (of the government) arises because the parties to the contract agree to this right through incorporation of the appropriate clause into the contract.

Even though the required clause is omitted, the right of termination for convenience may yet bind the parties "by operation of law." It is not to be assumed, however, that such clauses need no longer be incorporated into the contract.

To terminate a fixed-price contract for convenience, the contracting officer is required to send a written notice to the contractor and any known assignee, guarantor informing him that the contract is being terminated. As a rule, notice is first given by telegraph and confirmed

thereafter by letter. Letter notice alone may be used. In any case, the notice should clearly state:

- a. The effective date of the termination.
- b. Whether all work is to be stopped.
- c. The specific work to be terminated, if the termination is partial.

The prime contractor must comply with the notice of termination which generally requires the following: stop work on the terminated portion of the contract, perform the continued portion, and submit promptly any request for price adjustment.

A settlement proposal is a termination claim submitted by a contractor or subcontractor permitted by the terms of the contract for compensation for the termination. A settlement agreement in the form of an amendment to the contract settles all or a part of the contractor's claims for compensation. The settlement agreement includes any setoffs and counterclaims against the contractor and all claims of subcontractors against the contractor. The contractor cannot be reimbursed for costs beyond the termination date, nor for anticipatory profits.

3. Termination for Default

The exercise of this contractual right takes place by reason of the contractor's failure, actual or anticipatory, to perform his obligation under the contract.

If, after notice of termination for default, the contractor can establish that his failure to perform was beyond his control and without his fault or negligence, the termination may be treated as one for the

convenience of the government ,but the burden of proof rests with the contractor .

When the contractor has been allowed to continue work beyond the delivery date of the contract , it may be held that the government "waived" its right to default. Thus , such termination may be treated for convenience rather than for default .

It is important to note that the default clauses are permissive in that the government may terminate but is not necessarily required to do so. This affords the government the opportunity to view its contract from a total concept of what is best in its overall interests .

Default termination provisions in fixed-price supply contracts permit the government to terminate all or any part of the contract if:

a. The contractor fails to make delivery within the time specified in the contract .

b. The contractor fails to make progress so as to endanger performance of the contract , or fails to perform any other provision of the contract .

V. PHYSICAL DISTRIBUTION SYSTEM

The Navy distribution system is centrally controlled and directed by inventory control points, but operates decentrally to permit issue of material stock points without prior reference to inventory control points. Major distribution activities for fleet support are Naval Supply Centers, while the Naval Air Station is the primary source of supply for aviation units. Limited fleet support is also provided by Naval Shipyards and Naval Bases.

The Navy, unlike the other Military Services, requires a distribution complex with local issue authority. Such decentralization does increase the problems associated with control of inventory, but it provides for more flexible response to large volume requirements of its highly mobile combat forces. It also relieves the ship of keeping track of who is managing an item. The logistics support problem can be equated to supply of a village or small city which has the capability to move and does so on an irregular schedule. This requires carefully coordinated procedures for controlling actual physical movement of material which is best accomplished at the local activity level.

The supply pipeline consists of stock carried aboard each individual combatant ship, both high usage and insurance or sporadic demand items. High usage items are backup up by stocks aboard the mobile logistics support ships; this is the normal source of supply for these items when ships are deployed in a certain area far from the stock points.

The major functional components of the Navy's physical distribution system are grouped into five broad areas: (1) warehousing, (2) transportation, (3) inventory management, (4) communication networks, and (5) unitization. These five activity centers combine to form a physical distribution control network, which constitutes the Navy's physical distribution system.

A. WAREHOUSING FACILITIES

Warehousing is a functional activity which involves the storage and transshipment of goods without any change in the form of the goods. The objectives of warehousing are: (1) to provide good service to the Operating Forces; (2) to reduce cost of transportation; and (3) to maintain an investment in inventory sufficient to keep the right amount of stock on hand.

The network of facilities selected represents one of the most important decisions with respect to ultimate results. In particular, the number, the size, and the geographical arrangement of facilities operated or used have a direct relationship to the fleet service capabilities and corresponding logistics cost outlay of the Navy. From the viewpoint of physical flows, the facility network represents a series of nodal points through which materials and finished inventories physically move.

Concerning the physical distribution support system, a superior network of warehouse locations can result in speedy delivery at a minimum dollar expenditure. The degree of distribution efficiency attainable by a given physical distribution system is directly related and limited by the network of facilities.

Improvements in warehousing practices and inventory reductions have enabled the Navy to significantly reduce the amount of warehouse space in operation.

B. TRANSPORTATION MANAGEMENT

The Naval Chief of Staff provides guidance for determining the peacetime transportation needs of the Operating Forces as well as the transportation requirements for contingency, and emergency operation. In addition to his operational responsibilities and functioning through the Chief of Naval Material, the Naval Chief of Staff is responsible for appraising the overall effectiveness of transportation services provided to the Naval Operating Forces.

Various aspects of transportation management will be discussed in the following sequence: transportation planning, determination of transportation capabilities and requirements, and transportation cost characteristics.

1. Transportation Planning

Transportation produces the elements of surprise, concentration, and artful deployment of military capability.

Effective transportation is so vital to the success of military operations that thorough planning is essential to assure the proper allocation of available resources to meet the Navy's demands. Transportation requirements must be determined, the capacity of all means of transport analyzed, priorities established, and a movement program prepared. Since the ultimate payoff of logistic effort lies in the sustained support of combat

forces, transportation officers constantly work to fit the capabilities of transportation to the demands made by operational units and to see that all movements are made according to established priorities. To effect this timely logistic response to critical combat needs, transportation officers frequently have to make professional judgments based on an intensive study of military essentiality, and estimates that compensate for the uncertainties and fluctuations of military procurement.

While an efficient transportation system will do much to compensate for such uncertainties, the elements of priorities and allocations in all forms of transport, land, sea, and air, must be responsive to the critical timing and nature of combat needs. It becomes essential to plan in such a manner that, so far as is humanly possible, once a shipment moves from its point of origin it continues to progress without pause and with a minimum of handling. The closer a transportation system comes to achieving sustained movement from source to user, the more integrated, efficient, and less costly its operation becomes.

To carry out these objectives, the transportation planner must be able to anticipate requirements and fill them in order of urgency. This is especially true when transportation resources are limited. Then the movement capacity is distributed to users according to overall requirements and established policy.

2. Determining Transport Capabilities and Requirements

Given a network of facilities, i.e., points of origin and destination, the connecting link in the system is transport capability. Transportation and traffic management have received considerable attention over

the years both in military and in academic circles. Each of the military departments has a traffic manager who is responsible for administration of its transport program.

From the physical distribution system viewpoint the Navy must establish a capability to move materials and finished inventories between points of origin and destination. Three factors are of primary importance to establishment of the transport capability: (1) cost of service, (2) speed of service, (3) consistency of service.

The cost of transport results from the actual outlay for a movement between two points plus the expense related to having inventory committed to transit. Physical distribution systems should be designed to minimize the transport cost in relation to the total system cost; this does not necessarily mean that the lowest or cheapest method of movement between two facility points should be utilized.

Speed of service relates to the actual time required to complete a transfer between two points. Speed of service and cost of service are related in two ways. First, those transport specialists capable of providing fast service normally charge higher rates. Second, the faster the service the shorter is the interval that materials and inventories are frozen in movement between points of origin and destination.

Consistency of service refers to measured performance over a range of transfers between two points. In essence, how dependable is a given method of transfer with respect to time? In many ways consistency of service is the most important characteristic of a transportation specialist. If a given movement takes two days one time and six the next, serious

bottlenecks can develop in the flow of goods within the physical distribution system. To the degree that transport capability lacks consistency, safeguards in terms of extra inventory must be built into the system to prevent service breakdowns.

Two aspects of transport capability should be kept in mind as they relate to the physical distribution system. First, the selection of warehouse locations form a network which in fact limits the range of transport alternatives available and establishes the nature of the job to be accomplished. Second, the entire effort to integrate transport capability into a total system may be defeated if the service received is sporadic and inconsistent.

In transportation planning the capabilities of the different media of transportation within the area are considered. Railroads, highway transport, waterways and air transport, all have their capabilities. Transportation officers coordinate these capabilities to meet requirements.

Requirements for transportation are determined from the tonnage, mode of transport, and character of material to be transported, phasing and rate of movement of material, and the points of origin and destination. Attention is given to harbor depths, unloading facilities at destination, and loading and shipping schedules. Also required is a thorough knowledge of the documentation procedures and classification and rate structures of all transportation modes included in the plan. Since many of these factors are subject to change, the plan for dealing with them must be highly flexible.

Planning factors are continuously reevaluated to reflect political events, Navy capabilities, and the uncertainties and constraints that can

be anticipated in areas only partially under government control. Among other considerations, these reevaluations include revised estimates of requirements for major items of transportation equipment, spare parts resupply, maintenance costs, and manpower for the protection of transport lines and facilities. Where the cost of maintaining and protecting rail, water, and road networks becomes prohibitive, such contingency planning usually calls for increased air transport as a partial solution.

3. Transportation Cost Characteristics

Transportation probably ranks as the most important activity in the physical distribution system, consuming typically two-thirds of the Navy's dollars spent on all logistical support activities. Because of this, the military logistician needs a good knowledge of the transportation system.

The transportation system is physically composed of the networks over which freight is moved and of the equipment used to transport freight. The system includes vehicles, terminals, highways, waterways, airways, and railroad trackage.

a. Rail

In the railroad industry, the requirements for extensive fixed facilities, including land rights-of-ways, yards, and terminals, make fixed cost a relatively high percentage of total cost. This extensive resource of fixed facilities permits the rail carrier to operate long trains with a minimum of motive power and manpower in relation to the volume of tonnage moved, but it also results in rail fixed costs being higher as a proportion of total costs than those of any other transportation mode.

b. Highway

Contrasted with railroads, the truck operator has a relatively small investment in terminal facilities and operates truck and trailer units over publicly owned highways instead of privately owned right-of-way. Contrasted with rail, air, and water carriers, equipment investment depreciation is not as large an element in trucking costs. These two factors combined give trucking the lowest fixed costs as a percentage of total costs of any mode of transportation.

c. Air

Although a large jet transport costs more than \$10 million, airline fixed costs do not represent as large a percentage of total costs as in the railroad industry. An important contributing factor in this relationship is the fact that almost all terminal facilities are provided by the government. This relieves air carriers of a good portion of the fixed costs of their operations. Further, a portion of fixed costs is converted into variable costs due to the fact that airplane operators must pay landing fees to help maintain the terminal facilities.

d. Water

The fixed costs of water transportation as percentage of total cost are in most cases less than those of the airlines, although greater than those of highway carriers. Large bulk and dry cargo terminal facilities essential to water movement are most commonly leased from port authorities. Navigational aids and waterway improvement and maintenance are provided by the government.

C. INVENTORY MANAGEMENT

The objective of inventory integration into the physical distribution system is to employ the minimum quantities consistent with desired delivery capability and total cost expenditure. Excessive inventories can compensate for errors in the design of the basic system and may even help overcome poor administration of physical distribution activities. However, inventory used as a crutch can and normally will result in poor system performance.

Selective management is one of the most widely used methods of managing inventories. Selective management is a form of management in which the degree of intensity of management effort is determined by the prime characteristic of the item being managed. Under selective management, maximum emphasis is applied to those items of highest importance and having the highest dollar inventory investment, and minimum emphasis is placed on those items of lowest importance and having the lowest dollar inventory investment.

The Navy has, in pursuing its selective management policies, established two primary objectives; they are:

1. To provide maximum use of every possible management improvement and modern inventory techniques to insure support of the Naval Operating Forces at minimum cost.
2. To maximize the cost-saving potential of its selective management policies and to minimize the additional workload resulting from these policies.

The Navy selective management policies for the secondary end items, encompasses the following general areas:

1. Selective Management

This is a method of dividing items into categories to determine the degree of thoroughness of controls and review to be applied to an item. Some of the criteria upon which such decisions are based are: dollar investment in inventories, degree of protection desired against stock depletion, high unit cost of the item, combat essentiality of the item, and difficulty in procuring the item.

2. Economic Order Quantity

Known as EOQ, this policy is an equation of the total annual ordering cost versus total inventory carrying costs in order to arrive at the most economical procurement quantity.

In order to derive the EOQ model, the following definitions are needed:

Q = economic order quantity or optimum number of units per order to minimize total cost.

C = cost value of one unit.

I = inventory carrying cost, expressed as a percentage of the value of average inventory.

R = total annual demands rate.

S = ordering cost per order placed.

Total inventory carrying costs are derived in the following manner:

$$\frac{Q}{2} \times C \times I = \frac{Q}{2} CI$$

Average inventory quantity	x	Cost of carrying one unit of inventory per year	=	Total inventory carrying cost
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Total annual ordering costs are determined as follows:

$$\frac{R}{Q} \times S = \frac{R}{Q} S$$

Number of orders per year	x	Ordering costs per order	=	Total ordering costs
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Equating total annual inventory carrying costs to total annual ordering costs results:

$$\frac{Q}{2} CI = \frac{R}{Q} S$$

Restating this equation in terms of total costs (TC), the equation is:

$$TC = \frac{Q}{2} CI + \frac{R}{Q} S$$

Differentiating this equation results:

$$\frac{d(TC)}{d(Q)} = \frac{CI}{2} - \frac{RS}{Q^2}$$

In order to determine the optimal point, set the first derivative equal to zero:

$$\frac{CI}{2} - \frac{RS}{Q^2} = 0$$

$$Q^2 CI = 2RS$$

$$Q^2 = \frac{2RS}{CI}$$

$$\text{or } Q^* = \sqrt{\frac{2RS}{CI}}$$

This does not say whether total costs are at a minimum or maximum with respect to the economic ordering quantity. The use of the second derivative test will resolve this problem:

$$\frac{d^2(TC)}{d^2(Q)} = 0 + \frac{RS}{Q^3} > 0$$

A minimum total cost point rather than a maximum total cost point with respect to the EOQ is indicated by a plus sign in the second derivative test.

3. Reorder Point and Safety Stock

The most obvious problem of the prior inventory model is that certainty does not exist in most inventory situations. Both acquisition lead time and the demand for items usually fluctuate in a manner not completely known in advance to the decision maker. In cases where these two factors are relatively constant and predictable in advance, previous inventory models provide us with a close approximation of reality.

The assumption dealing with economic order quantities are not applicable to all inventory situations. Demand for the inventory items can be greater or less than anticipated due to internal and external factors. Similarly, the acquisition lead time can also vary from favorable to unfavorable due to the supplier(s) or the transportation carrier(s).

If inventory is not available when needed due to any internal or external factor, a stockout occurs. This situation can lead to a serious problem, particularly in the military field.

The reorder point is defined as a condition that signals a purchasing agent, that a purchase order should be placed to replenish the inventory stock of some item. The term safety stock refers to extra inventory held as a protection against the possibility of a stockout.

D. COMMUNICATION NETWORKS

Distribution communications represents the most neglected activity area in the physical distribution system. In part this neglect has resulted from the lack of data processing and data transmission equipment capable of handling the necessary flow of information. Equally the cause of neglect has been the lack of realistic understanding of the importance of rapid and correct communications with respect to physical distribution performance.

The total physical distribution system is designed to achieve an orderly flow of goods from the point of initial customer order to the time of product delivery. Distribution communications have direct impact on system capability in two ways: (1) quality of information and (2) speed of information.

A deficiency in the quality of information can result in countless problems. Such deficiencies fall into two broad categories:

(1) Information received may be incorrect with respect to appraisal of trends and events. Because a great deal of physical distribution flow takes place in anticipation of future transactions, an inaccurate appraisal can result in a deficiency or abundance of inventory commitments with all associated costs.

(2) Information may be incorrect with respect to a specific customer's needs. A distribution center who processes a wrong order confronts all the costs of physical distribution without gaining any result. In fact, the costs are often compounded by the need to absorb the cost of returning the order and, if the demand still exists, once more attempting to provide the proper assortment in an effort to try maintaining a good service.

The speed of information flow is directly related to the integration of fixed facilities, transport capability, and inventory allocation. Once again it is a question of balance among all components of the physical distribution system.

Two managerial tasks are directly related to military distribution communications. The first is customer order processing. An order represents a critical information flow, which is the prime input of the total logistics system. The second managerial task relates to customer adjustment. The adjustment function constitutes administration of an order until it is fully received by a customer in a damage-free condition. Shipment of a customer order on time is not sufficient physical distribution

performance. The order must be received as promised with respect to time, quality, and quantity.

In general, the more efficient the design of a physical distribution system the more sensitive it is to disturbances in information flow. Balanced systems have no extra inventory holdings, and safety stocks are the minimum possible within the consistency of transport capability. Incorrect information can cause a serious disturbance in system performance and delays in corrective communication flow can amplify the range of error resulting in a series of oscillations in over- and under-correction. It is communication that renders a physical distribution system dynamic, and the quality and timeliness of information is the prime determinant of system stability.

E. UNITIZATION

The design of a basic physical distribution system is primarily concerned with the four activity centers consisting of warehouse locations, transportation capacity, inventory allocations, and communication network. These areas are subject to a wide variety of alternate design arrangements, each of which has a degree of potential effectiveness and a limit in attainable efficiency. In essence, these four structural areas provide a system framework for integrated product flow. One final area, that is unitization, also represents an integral part of the physical distribution system.

Unitization does not fit into the neat structural scheme of the other areas. Rather, unitization occurs throughout the system and is directly

related to the physical flow of items. Thus, unitization involved inventory as it flows through facilities and as it is transported between locations. Such flow is only initiated in response to a message expressing a need at some point in the system.

In a broad sense, unitization involves material handling, packaging, and containerization.

1. Material Handling

Material handling consumes a great deal of the cost of physical distribution in terms of operations and capital expenditure. It stands to reason that the less a product has to be handled in the total exchange process the less restricted and more potentially efficient will be the total physical flow.

2. Packaging

To facilitate handling efficiency, individual items are combined into larger cartons containing a group of cans, boxes, bottles, or whatever. This master carton performs two functions. First, it serves to protect the product while the physical distribution process is underway. Second, the master carton serves as a primary load allowing the handling of one larger package as opposed to a multitude of individual units.

For purposes of material handling, the master cartons are normally grouped together into larger lots. These larger lots may be banded with steel strapping, combined with tape, stocked into a wire cage, or stocked on a wooden pallet to name a few common techniques. Each of these grouping devices provides a load of sufficient size to justify some form of specialized material handling equipment to assist in movement.

3. Containerization

Containerization is the packing of goods of like or unlike characteristics in an enclosed box to eliminate rehandling of materials in their transportation from point to point. Containers are commonly fitted with fixtures which allow them to be transferred easily from vehicles of one mode of transportation to those of another. As such, containerization is necessary to the full development of the potential of most coordinated transportation services.

Containers have generally provided their users with: (1) lower handling cost (resulting in lower freight rates), (2) lower in-transit insurance costs, (3) reduction of product damage in transit, and (4) the reduction or elimination of pilferage during shipment. To date, these advantages have been offset somewhat by the cost of containers, the general lack of adequate facilities for handling them, and the problem of the return of empty containers to a point of reuse.

Unitization effectively integrated into a physical distribution system can substantially reduce problems related to time and ease of product flow throughout the total system. Although such programs have a related expense, if properly developed they may more than pay for themselves by reduced handling, lower transport cost, improved customer service, and general overall efficiency.

VI. MAINTENANCE AND SUPPLY MANAGEMENT

A. GENERAL MAINTENANCE MANAGEMENT

Responsibility for the management of maintenance in the Navy is shared by the Naval Chief of Staff and the Chief of Naval Material. The Secretary of Defense has assigned the overall responsibility for the management of maintenance to the Naval Chief of Staff. Specific maintenance responsibilities are assigned to the Chief of Naval Material, these responsibilities include direct control of third line maintenance, the responsibility for providing broad technical guidance for both first-line and second-line maintenance level activities, and the responsibility for the implementation and execution of maintenance policy.

The technological advances in Navy equipment and systems during the past two decades have increased the complexity and costs of weapons and equipment. Since the responsiveness of the Naval Operating Forces depends on the continuous readiness of Navy equipment, it is imperative that the Navy take action to insure that the equipment is maintained at a maximum state of readiness at a minimum total cost. The maintenance direction is oriented to the achievement of this objective and the attainment of this objective becomes the goal of the Navy maintenance effort.

The technological advances in hardware require a continuing effort to sustain the technical capability to accomplish the maintenance task.

The resources required to support Navy hardware are dictated by the amount and frequency of maintenance required for the item. This

amount and frequency of maintenance governs the workload to support the hardware in an operational environment at the various levels of accomplishment. In the management of maintenance, the Navy applies the three levels of maintenance: the first-line, the second-line, and the third-line maintenance levels. These levels are distinguished by differences in capability of the facilities concerned, rather than by the type or kind of maintenance performed. Capability for maintenance on aircraft, shipboard, and shore equipment is controlled through the assignment of skills, tools, and repair parts and whether or not the equipment to be maintained must be removed from the ship or aircraft.

First-line maintenance is defined as that maintenance which is the responsibility of, and performed by, a using organization on its assigned equipment. Its phases normally consist of inspecting, servicing, lubricating, adjusting, and replacing parts, minor assemblies, and sub-assemblies.

Second-line maintenance is that maintenance which is the responsibility of, and performed by, designated maintenance activities for direct support of using organizations. Its phases normally consist of calibration, repair or replacement of damaged or unserviceable parts, components or assemblies; and providing technical assistance to using organizations. Second-line maintenance normally is accomplished in fixed or mobile shops, tenders, aircraft maintenance departments of Naval Air Stations, and other shore based facilities.

The third-line maintenance is that maintenance which is the responsibility of, and performed by, designated maintenance activities to

augment stocks of serviceable material and to support first-line and second-line maintenance activities by the use of more extensive shop facilities, equipment, and personnel of higher technical skill than are available at the lower level of maintenance. Its phases normally consist of repair, modification, alteration, modernization, overhaul, rebuild of parts, assemblies, subassemblies, components, and end items; the emergency manufacture of nonavailable parts; and providing technical assistance to using activities and second-line maintenance organizations. Third-line maintenance normally is accomplished in fixed ships, shipyards, and other shore based facilities. The Navy also considers designated repair contractors to be third-line maintenance level activities.

The structure for handling maintenance activities at the first-line and second-line levels begins with the Naval Chief of Staff and extends downward to the Fleet Commander and Type Commander to the force units. At the force unit level, first-line maintenance is assigned to the military personnel of a given ship, squadron, or shore unit. The second-line level maintenance is assigned to a repair shop, tender, aviation maintenance department of a Naval Air Station, or other supporting repair facility. In the case of third-line level maintenance, responsibility flows from the Naval Chief of Staff through the Chief of Naval Material, through the appropriate systems commands to the various major facilities.

B. PLANNED MAINTENANCE SYSTEM

The primary system employed by the Navy in the management of its maintenance function is the Navy Planned Maintenance System. The

Planned Maintenance System, which is fairly recent in origin, is operational at the first-line and second-line levels. It is designated to:

(1) simplify maintenance procedures, (2) define, schedule, and control scheduled and preventive maintenance, and (3) forecast and plan manpower and material requirements for maintenance.

All preventive maintenance tasks for all shipboard or squadron equipment are identified and listed separately on maintenance requirement cards which prescribe what inspections are to be performed, when and how they should be performed, who should do them, what tools and special equipment are required, and what safety precautions should be observed. This information is provided in a form which is readily accessible and understandable to technicians, supervisors, and managers.

The Chief of Naval Material is responsible to provide a program for maintenance to effectively meet sustained readiness for missions assigned. The guidelines for the use of in-house or contract sources are provided by this directive. The guidance provided states:

(1) That Navy will provide first-line and second-line maintenance support for assigned weapons systems and equipment.

(2) That the criteria used to determine the source of direct support will be:

- (a) Need for a training/rotational base for military personnel,
- (b) Security implications, and
- (c) Cost effectiveness

(3) That a combination of contract and in-house will be used for third-line maintenance in order to enhance the flexibility and expand the potential capability for emergency needs.

(4) That Navy's facilities will be kept at a minimum level of capability and capacity to insure technical competence and resources necessary to meet military contingencies.

Maintenance for mission-essential material will be accomplished by the Navy if (1) source of support must be controlled, (2) technical ability must be retained or upgraded, (3) experience and information data are required for specifications, performance, and cost, and (4) when technical competency is required for analytical evaluation to improve performance of equipment.

C. REPAIRABLE ITEM MANAGEMENT

As equipment and systems in the Navy grow more complex and more difficult to maintain at the operating level, increasing use is being made of replacement equipment and components. These recoverable items, or repairables, are components of a system or equipment (e.g., electronic control box, power supply, starter) or end items (e.g., a portable pump) which are replaced periodically, or upon failure, and can be economically restored to a serviceable condition. When the technician removes a failed repairable item, he draws a serviceable one to replace it and turns the failed item in for repair. This returned material, after undergoing repair or rework, becomes a source of supply of serviceable material for the inventory manager. The dependence of the supply system on repair as a

source of supply requires prompt maintenance action to insure that repairables are made serviceable in a timely manner.

Most repairables by their nature are essential to the performance of the mission of the system of which they are a part. In order to maintain an effective repairable management program, and, therefore, an adequate supply of serviceable items, a higher degree of control is required to manage this material than is required in the management of consumables, not only on the part of the inventory manager but also by the Fleet Commander, Fleet Units, commercial contractors, Hardware System Command repair facility, and the Supply System.

One of the significant considerations in determining the quantity of a given repairable to be carried in the Navy inventory is the period from the time the failed unit is removed from service until it is placed back in a serviceable condition and made available to potential users. It is the Navy's objective to keep this turn-around time as short as practicable. The several elements of the turn-around cycle and the organizational or command levels responsible for each element are as follows:

- (1) Removal, replacement, and repair at the second-line level are responsibilities of the Fleet Commanders and their subordinate commanders.

- (2) Repair of items subject to the inventory manager requirements is the responsibility of the commanders of the Hardware Systems Commands through their assigned repair activities, or the inventory manager for contract performance for commercially repaired items, and

(3) Return of a serviceable item to stock so that it is made available to meet user requirements is a responsibility of the inventory manager and the Navy Supply System.

Large numbers of the Navy's repairables are repaired at the first-line or second-line levels. A high rate of repair at the first-line or second-line maintenance levels for a given rate of failure allows minimum system inventory levels to support the repair program because of the shorter turn-around time involved. If less repair is accomplished at the lower levels for the same rate of failure, and more carcasses are returned to the third-line level for repair, the system inventory requirements are greater to support the increased retrograde pipeline.

D. ROLE OF THE HARDWARE SYSTEM COMMANDS AND INVENTORY MANAGERS

The decision as to which maintenance level(s) a repairable item will be repaired by is made by the Hardware System Commanders. In determining the level at which repair will be made, the Hardware System Commanders consider factors such as: (1) technical feasibility of repair, (2) maintenance capability and economy of repair at the various levels, (3) military essentiality of the component in question, and (4) physical characteristic of the item (i.e., is it practicable and feasible to remove and replace the component or is it more feasible, due to size and weight constraints, to repair the component while it remains installed). Other responsibilities of the Hardware System Commanders include the assignment of source and maintenance, the preparation or approval of repair specifications, the designation of repair facilities (i.e., qualified

contractors or specific activities in the Navy or other services for third-line level repair of the item), and insuring that required repair capability and capacity are established. The Hardware System Commands command and manage the facilities which perform Navy in-house repair.

Inventory control tasks performed by the inventory manager for repairables are similar to those performed for other items of supply. However, there are certain additional tasks incident to managing repairables which should be noted. The inventory manager should:

- (1) Establish specific arrangements for repair services with Navy or commercial repair sources.
- (2) Determine current item repair requirements based on the current and projected on-hand quantities of serviceable items and the current and projected failure rates and turn-around times.
- (3) Advise the repair activity concerned of the current item repair requirements and the relative urgency of these requirements.
- (4) Maintain and watch over individual item turn-around times and evaluate the actual experienced turn-around time against current and projected failure rates and on-hand inventories.
- (5) Maintain information concerning the location and status (i.e., awaiting repair or undergoing repair) of items returned for third-line level repair.
- (6) Distribute serviceable items.
- (7) Forecast requirements for Navy third-line level repair.

VII. FUNDING IN LOGISTICS MANAGEMENT

A. GENERAL BACKGROUND

History shows that Government fiscal management has been subject to constant change. As a consequence, care must be exercised by examining thoroughly any reference relating to this subject for current applicability. Therefore, this chapter will discuss in a general way the various facets of fiscal management and funding for the purpose of point up problems involved and the means that may be used in solving them.

The Military Services did not have complete data relative to the dollar value of stocks on hand at any given point in time. Without such information, it was extremely difficult to justify DOD requirements for parliamentary appropriations. This is to say that while the military services were asking Parliament for appropriated funds needed to effect procurement of material, they were not capable of fully applying available, applicable assets to their requirements. Conceivably, a Military Service could have had an unknown quantity and dollar value of material on hand while at the same time it was submitting requests for appropriations to procure the same type of material. The introduction and implementation of financial controls ultimately assisted the DOD in correcting such deficiencies.

The DOD was faced with the requirement of developing and implementing control devices which would assure the Parliament that all the military services were effectively managing their resources. Furthermore, whenever any of the Services would ask for any parliamentary appropriation,

Parliament expected it to account for and report upon the type and value of resources already available .

In the mid 1960's many elements within the Department of Defense were still attempting to manage and control logistics operations with methods that generally were acceptable only under wartime conditions . Such uneconomical methods were considered to be causing Government expenditures to exceed those expected of the military services during peacetime . It could very well be said that inefficiency and ineffectiveness were not caused by the use of obsolete methods alone , but rather by the lack of a more modern approach to managing and controlling the multi-million dollar business of the defense logistical structure .

To correct the situation , the DOD required all of the military services to account for all inventories , and inventory transactions on both a quantitative and monetary basis .

Although each service was allowed to develop and to implement its own system , each sought a device which would help all logistic managers to gain and maintain control over all inventories . Any system eventually chosen would necessarily have to be an all encompassing , manageable system which would not only enable the service to comply with the DOD requirements , but which would also provide each echelon of management with useful inventory data which it required to manage its logistic function in an effective and efficient manner .

B. OBLIGATION OF FUNDS

There are several budget related terms which will be discussed briefly, so that the readers will be familiar with them.

An obligation is a Government liability resulting from a contract, purchase order or similar document; a legal duty to pay the amount due. When a contractor has delivered the supplies or services and the Government, i.e., Department of Defense has accepted them, the obligation is liquidated by payment to the contractor. A commitment is an administrative reservation of funds against a future obligation on a contract. An allotment is an authorization to incur obligations within a specified amount.

1. Time Limitations

Parliamentary limitations on the use of appropriated funds are either time restrictions or subject matter restriction. Time restrictions limit the time during which funds may be obligated or expended or both.

Annual funds must be obligated during the year for which they are appropriated or else they are lost for the purposes of obligation.

Annual appropriations are provided by the Parliament for such things as pay and allowances for military personnel, maintenance of Defense equipment and operations.

2. Subject Matter Restrictions

Subject matter restrictions limit the use to which money may be put for accomplishing specific purposes, such as a program or project. Parliament specifies in its appropriation acts the purpose for which funds are appropriated.

The purposes have been such things as building a drydock at a specific location, or building a ship. The appropriation specified by name the particular project and the specific amount of money. Execution of the project required strict administration with no latitude on the of the funds.

The DOD is required to prepare its budget estimate and to administer its programs so that the cost of performance of identifiable programs can be shown. This has resulted in a "performance-type" budget wherein general categories of functions are established and the appropriation act authorizes funds for these functions. Major categories of functions are personnel, maintenance and operation, major procurement, research and development, and construction. By eliminating specific item by item listing and using general categories instead, the Military Services have far greater flexibility of programming and reprogramming within the general appropriations.

C. INDUSTRIAL FUNDS

It is required that all Government Departments submit a cost-to-performance type budget each fiscal year. Arising from this requirement was the concept of providing a fixed sum of money to an activity that provides services for another activity. This fixed sum of money would be used to perform a particular type mission. Upon completion, a bill would be submitted to the requesting activity which would in turn pay the amount of money actually used to perform the mission requested. In theory, there would be a perpetual fund available, a revolving fund, which would never have to be replenished through Parliamentary actions.

The industrial fund is one of the revolving funds. Theoretically, it has no loss or profit and is not subject to quarterly or annual limitations. Responsibility is centralized at activity command levels with financial control administered through a tailor-made, double entry, accrual type accounting system. The costs included in the industrial fund are direct labor and material, other direct cost, operating overhead, and administrative overhead.

The industrial fund presently excludes costs of military pay and depreciation. Machinery, equipment, and real property provided by appropriated funds are not included as industrial fund assets.

Each industrial fund consists of accounts receivable, inventories of materials, supplies, work in process, and all other assets pertaining to or acquired in the operations of the activities financed under the fund; subject to all liabilities incurred in connection with such operations. The industrial fund holds in suspense the cost of manufacturing and of performing services until the completed goods or services are provided and charged to the customer activity responsible for ordering the goods or services or receiving the benefits.

1. Method of Payment

Methods of payment under an industrial fund are as follows:

- (1) Customers are billed for the incompleted manufactured end item. This is necessary sometimes, because the industrially funded activity is short of operating cash that is necessary to buy raw materials, pay personnel, etc.

(2) The customer is billed after the completed end item is produced or services are actually received.

2. Payment Rationale

The rationale governing the methods of payment is as follows:

(1) The customer has the funds required for the item and/or services. Obviously, he has set aside such funds; otherwise, he would not place his orders.

(2) The industrially funded activity is expected to operate with a minimum amount of operating cash. If it could not collect in advance, then it would be necessary to obtain additional cash elsewhere; while customer's funds remain dormant.

(3) This method of accelerating billing and collection procedures has been used to obtain required operating cash for other purposes.

3. The Operating Budget

Within the industrial fund, the operating budget is an extremely important tool. It represents a program or plan of action and a means by which fund requirements are met. It is the basis for reviewing and analyzing the degree of operational effectiveness and efficiency. Because the budget is a significant part of the operation, the terms associated with it should be clearly understood. The following paragraphs clarify the terminology used in the discussion of the operating budget.

a. Cost Centers

The organizational elements of an activity are frequently referred to as cost centers, for cost accumulations and control purposes.

A cost center is an organizational element responsible for a specific

function or family of homogeneous functions to which costs are budgeted, collected (reported), distributed, and controlled. There are three types of cost centers:

(1) Production and Mission Cost Centers. Organizational elements directly engaged in carrying out the installation's mission assignments; i.e., those actually performing fabrication operations and accomplishing depot maintenance.

(2) Productive Support Cost Centers. Organizational elements which directly support assigned missions; such as production control and quality control offices.

(3) Nonproductive Support Cost Centers. Organizational elements whose activities are not directly identified to any single element of the assigned mission; such as comptroller organization.

b. Internal Operating Budget

Internal operating budgets are comprehensive financial plans (by cost center) designed to implement the program and financial guidance received by an activity. They project in monetary terms operating requirements for personnel, materials, supplies, and contractual services to accomplish a program workload. They are based on the estimated cost of operations of each organizational element engaged in accomplishing the activity work program.

4. Responsibilities of Directors

The directors of industrial funded activities are responsible for:

(1) Preparing and submitting annual budget submissions, preparing internal operating budgets, and establishing overhead rates and predetermined billing rates.

(2) Submitting quarterly revisions of the internal operating budget, overhead rates, and predetermined billing rates to the headquarters of the command for approval.

(3) Executing approved operating budgets.

(4) Reviewing accomplishments against operating budgets quarterly.

The installation comptroller is the principal assistant of the director with respect to budgeting and the use of financial resources and is responsible for staff supervision of budgeting activities. Each department chief is responsible for administering the activities of his department and had to live within the budgeting limits set.

These operating budgets are based on estimated incompleeted orders on hand at the beginning of the budget period, program guidance provided by the command, projected workload estimated from other services, personnel ceilings or guidance, and other known factors having a bearing on operations.

A separate operating budget is prepared for each cost center, based on the workload guidance provided by the department chief. Cost accounting data, wage rates, and other historical data required for pricing purposes are furnished to cost centers by the comptroller. To the maximum practicable extent, each cost center prepares its own budget. Those budgets provide estimates for: direct labor hours and dollars, direct materials and supplies, direct contractual costs, other direct costs, indirect labor hours and costs, and other indirect costs.

Cost budgets are reviewed by the department chiefs or directors and consolidated into department operating budgets. After appropriate review and adjustments, the operating budgets are combined to form the activity operating budget.

5. Types of Budgets

The types of budgets used in an industrial funded activity are:

a. Production Budget

A production budget usually consists of:

(1) A schedule of production and estimated requirements of equipment and facilities, direct material, and direct labor to accomplish the scheduled production.

(2) The estimated costs of production requirement is computed from the most recent labor rates and cost of materials.

b. Expense Budget

The expense budget consists of estimates by areas of responsibilities of the various expense elements required to support production activity at the level established in the production budget. The expense budget is designed to prevent incurring costs in excess of amounts reimbursable for goods or services by ordering activities, the accumulation of excess inventories of stock items, and the incurring of liabilities for expenditures in excess of available resources.

c. Procurement Budget

The procurement budget controls the amount of contracts and orders placed on accounts for the balances of orders outstanding in

order to prevent the incurring of costs which may result in losses to the industrial fund. To the extent feasible and appropriate, contracts and orders are based upon the requirement for material and services to fill the specific customer orders. Obligations undertaken against the general operating requirements of the activity are held to the minimum appropriate in the light of the character of its operations.

d. Labor Budget

The labor budget provides employment plans in terms of numbers of employees, and policy concerning the spreading of work and working overtime.

The financial budget summarizes the sales, production, and supporting detail, forecasted revenue and costs and balance sheet statements. The revenue and costs statement relates estimated costs to estimated revenues by months and quarters of the coming year. The balance sheet statements show anticipated working capital requirements for costs, accounts receivable, inventories, other assets, and estimated liabilities at the end of each month of the coming year.

D. CONSUMER FUNDING

Consumer funding is the term applied to the concept of placing maximum responsibility for the management and control of the use of resources as close to the point of consumption or use of those resources as possible.

The Naval Chief of Staff allocates portions of the annual appropriation to the fleet commander, who in turn allots funds to the type commanders. At this level, funding is accomplished by the issuance of operating budgets.

These operating budgets are controlled, accounted for, and reported under the accrual system and provide the operational management levels with tools required to effectively manage the resources needed to perform missions and functions assigned. The focus of management attention is on expenses which represent resources consumed in the performance of the mission for the period reported.

The type commanders, in turn, fund ships and units by granting to them the authority to cite the type commander's operating budget for operating expenses, including procurement of supplies and services, subject only to operating target amount constraint. Thus, the individual ships are relieved of the administrative functions associated with full operating budget accounting and are obliged only to report the use of funds and the units of work accomplished to the type commander.

Shore activities are primarily funded by operating budgets issued through the chain of command. The commanding officer of a shore activity normally controls the use of funds available to him by allocation to the departments of his command on the basis of a station budget.

VIII. CONCLUSION

There is only one reason for existence and one function to perform for the Naval Headquarters and the Shore Establishments, that is to provide adequate logistic support of all kinds to the Naval Operating Forces, so that they can accomplish their assigned mission of fulfilling the Navy's role in support of fundamental National Policies.

Logistic support, which is an element of that broad activity called logistics, is concerned with those aspects of military and naval operations including the maintenance and movement of forces. More specifically, it is an element of naval material logistics support, which consists of determination of requirements, procurement, distribution, and maintenance of material to equip and support Naval Operating Forces.

The Navy has developed policies of selective inventory management, which concentrate time and attention on those Navy items justified by military essentiality and having the highest dollar inventory investment, and minimum emphasis is placed on those items of lowest importance and having the lowest dollar inventory investment. By adopting these policies it is expected that items will be available when and where they are needed, and that inventories will be kept to a minimum, consistent with the need.

Since the responsiveness of the Naval Operating Forces depends on the continuous readiness of Navy equipment, it is imperative that the Navy should take definite actions to insure that the equipment is maintained at a maximum state of readiness at a minimum total cost. This condition

dictates that the objective of maintenance should be oriented to a state of maximum operational readiness and minimum total cost. Maintenance is oriented to the achievement of this objective.

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